What is so special about TETRA compared with other digital systems?

The benefits of TETRA compared with GSM and Frequency Division Multiple Access (FDMA) systems is that it is more flexible for transferring non-voice information. For example, TETRA is designed to allow simultaneous transmission and reception of voice and data over one radio unit. The benefits for dispatching Fire Crews and A&E Ambulance crews with this capability are obvious.

In addition, TETRA has the capability of utilising all four (4) Time Division Multiple Access (TDMA) time slots for transferring non-voice information with usable data rates of up to 28.8 Kbps. The use of higher data rates will transfer non-voice information more efficiently and quickly.

TETRA is currently four times more spectrum efficient than GSM and twice as efficient when the half rate codec is implemented. TETRA is also twice as efficient than current 12.5kHz channel spaced FDMA systems. GSM does not have a Direct Mode Operation (DMO) to allow localised communications independent of system infrastructure. Similar to other digital systems, TETRA offers constant voice quality over the RF coverage area as well as secure (encrypted) communications.

How will a single digital trunked PMR system allow each emergency service to communicate with each other in the case of major incidents?

As TETRA is probably the preferred choice for the PSRCP, it is important to know how a TETRA TDMA system enables all emergency services to communicate with each other when required.

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The facility on TETRA that enables this inter-communication is called Direct Mode Operation (DMO) which will become available in three versions.

1. DMO between radio users independent of network infrastructure. This version would probably be used in poor RF coverage areas of the main network. However, as the main network would be engineered to provide optimum RF coverage it is unlikely that this version would be used frequently.

2. DMO Gateway (range extender) to the main network. This version will enable users outside of handportable coverage areas to utilise the mobile radio installed in their vehicle as a 'gateway' to maintain communications with the main network. This will probably be the main use of DMO.

3. DMO Repeater (local coverage range extender). This version would probably be used at incidents requiring greater RF coverage and would be provided by using a vehicle borne radio unit to repeat localised DMO communications. This version would also have a gateway facility into the main network if required.

In addition to the above, DMO has an another facility called Dual Watch, which enables a DMO user's radio to monitor the main network for important calls, assuming they are in RF coverage of the main network.

Overall, TETRA will provide for more efficient and interference free localised incident communications than current FDMA technology, whether digital or analogue. Even though other digital technologies can provide good DMO facilities within the same radio unit and network (excluding GSM), TETRA is currently being designed to provide the optimum solution.

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Give an example of how TETRA can enhance Public Safety operations on a Pan-European basis.

Public Safety communities will find interoperation and cross border operations much easier with a TETRA system. For example, the police could pursue criminals across borders, still receiving back-up from their local control while initiating communication with the new country's police force. All this will be done using the same radio communication system.

So how will TETRA operate, what are the differences and the real benefits it holds for the future?

Quite simply, TETRA utilises Time Division Multiple Access (TDMA) techniques to provide four simultaneous and independent communications paths over one RF carrier. The use of TDMA technology provides unique facilities not previously available on Frequency Division Multiple Access (FDMA) analogue FM systems.

For operators, this holds several major advantages in terms of infrastructure provision. Compared to existing analogue base stations, TETRA means dramatically fewer elements and components, reduced antenna combining requirements and less power consumption. Ultimately, this translates into huge financial benefits - equipment costs are cut, installation and site rental costs are lowered and life cycle costs are significantly reduced.

As well as operational flexibility and cost effective duplex operation, TETRA will provide improved efficiency by extending mobile radio communications into PABX/PSTN networks.

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Simultaneous voice and data transmission will be one of the main selling points for TETRA. Data and voice messages will be sent and received on the same radio without contention and via simple user interfaces. The other major advantage of TETRA technology is that it offers bandwidth on demand. One, two, three or all four of the time slots can be used to send and receive data. This allows practical use of slow scan video, digital mapping, image transmission and other high speed data applications.

Will the TETRA standard be used solely by Public Safety Organisations?

While the major market for TETRA will initially come from the emergency services, it is thought that civil use of TETRA could eventually represent some 50% of the total market in Europe. Hence the current study by the European Radiocommunications Office (ERO) to find a harmonious new frequency band for TETRA across Europe.

Market indicators also suggest that there is a high probability that TETRA will be adopted outside Europe and, even though it is not expected to take the same routes as GSM and MPT1327, the destinations will probably be the same.

How will standardisation affect the market?

There is now a well established trend towards the adoption of open standards by both Regulators and users. This is understandable bearing in mind that proprietary systems tie users to their chosen supplier for security of supply, choice and the price of equipment additions and system expansion.

There is also evidence of a new trend towards sharing within traditionally private systems. Several Western European countries are planning to operate a national mobile radio system infrastructure shared between Police, Fire and Ambulance services.

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For such systems to operate successfully, independent users will deem it necessary to have greater choice of mobile radio equipment all conforming to an open standard. As there is a trend towards digital, the only open standard designed exclusively for PMR/PAMR is TETRA.

There is a great deal of regulatory motivation for issuing licenses for shared systems. Amongst these are benefits such as the revenue from licenses; better services for PMR users; ease of spectrum congestion; reduction of spectrum planning and overheads; greater control of spectrum users; and as a driver to promote economic growth.

Similarly, user motivation for these systems are also high. Shared systems usually provide geographic wide area coverage thereby matching most user needs. In effect, users will be able to obtain better return and greater leverage from their communications investment by utilising shared systems.

Are there any obstacles or threats to TETRA?

As with any new technology standard, the principle hurdle is obtaining industry commitment and support. While almost all the European PMR suppliers are backing TETRA, this needs to be reinforced by investment and collaboration from certain key users such as the Police and shared operators and other emergency services.

As many of you are aware, the core TETRA standards were voted full ETS status in December 1995. Of the 21 nations who participated in the voting , all said Yes to TETRA making it a 100% success. So are there any hurdles left?

The most serious challenge is whether the Police Co-operation Council (PCC), which includes participants from the Schengen telecommunications groups, chooses TETRA as the technology for Emergency Services throughout the EU. The return on investment for developing TETRA requires this market and it is this that will result in the economies of scale, healthy competition and supplier choice required by other potential users in the civil arena.

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Several other smaller obstacles also have to be overcome - timely completion of the remaining sub-sets of the standard, resolution of Intellectual Property Rights and interoperability between different manufacturers' equipment.

There is no doubt, however, that the significant investments already made in developing TETRA by members of the TETRA MoU will ensure that much of this is put in place during the course of the year. This in mind, we are confident that interoperable and fully functional TETRA products will come to market as early as 1997.

What about the challenge from competing technologies?

The market size of TETRA outside could be reduced by the uptake of GSM, APCO25 and iDEN which are all open standard technologies. It is interesting to note that the completion of the standard for both trunked APCO25 and TETRA are expected to happen at the same time.

The key to TETRA's success will be in its wide ranging functionality, when one looks at its range of capabilities against those of other mobile communications systems and in particular GSM, it is clear that, for many PMR applications, TETRA offers the most appealing solution.

Is the TETRA programme delayed?

Motorola demonstrated the first TETRA alpha site equipment working nearly two years ago and we have switched on the first proving system in Jersey, a test network for practical evaluation by the States of Jersey Police.

The engineering, marketing and software development programmes are on track for our published goal of a first launch of product in 1997. And, based on our previous experience in Wide Area trunking and digital Systems, we are confident in our solutions.

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What should we done now to prepare for TETRA?

While we can spend a great deal of time discussing the future implications of TETRA, we are now at the stage in its development where operators and users must start taking action. By preparing now for TETRA, they can ensure its fast and effective introduction, thereby reaping the many cost and application benefits that it will harness.

There are four key areas which need to be actioned - market demand, competing services, civil spectrum and business plans.

To prepare for this new multi-functional, multi-application environment, we must act together - users, operators and manufacturers alike. For everyone to benefit we must act now to research applications, develop equipment, lobby for frequency, prepare business plans and make a recognised commitment to the standard.

The TETRA wagon is rolling fast. The time for sitting on the fence is over. We must all be prepared to jump aboard now or risk being left behind. With a committed industry and user platform we can drive TETRA into a real, tangible communications proposition - one which will bring massive benefits, revolutionise working life and create a future that yesterday's visionaries would be proud of.

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